COMPLETE LISTING OF THE CLAIMS

The following lists all of the claims that are or were in the above-identified patent application. The status identifiers respectively provided in parentheses following the claim numbers indicate the current statuses of the claims.

1. (Currently Amended) ~~In an~~ An optoelectronic timing system~~, an adaptive frequency generator system~~ comprising:

at least one semiconductor laser configured to ~~issue~~ generate subnanosecond optical pulses~~ defining a periodic pulse train~~;

a trigger system coupled to the semiconductor laser so that the semiconductor laser generates an optical pulse in response to an optical pulse received by the trigger system;

a regeneration waveguide coupled to directed optical pulses from the laser to the trigger system, wherein a length of the regeneration waveguide defines a first frequency at which the laser generates pulses of a pulse train;

~~at least~~ a first optical waveguide~~, the waveguide~~ configured to define a first time-quantifiable optical path for a pulse of the train;

~~at least one additional~~ a second optical waveguide~~, the additional waveguide~~ configured to define a second time-quantifiable optical path for a pulse of the train~~ different from the first waveguide~~;

a first nodal point coupled to the first and second waveguides at which pulses of the train are directed into the first and second waveguides; and

a second nodal point coupled to the first and second waveguides at which pulses directed into the first and second waveguides are recombined, wherein: ~~; and~~

~~wherein, the length of~~ the second time-quantifiable optical path ~~has a defined numerical relationship to the length of~~ differs from the first time-quantifiable optical path, such that ~~the periodicity of pulses recombined at the second nodal point has the same numerical relationship with the periodicity of the issued pulse train~~ each of the pulses coupled into the first and second waveguides at the first node results in a first pulse at the second node from the first optical waveguide and a second pulse at the second node from the second optical waveguide; and

pulses arriving at the second node including the pulses from the first and second waveguides have a second frequency that is greater than the first frequency.

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2. (Currently Amended) The system according to claim 1, wherein the ~~at least one semiconductor laser is configured to provide a pulsed output having a periodicity in the range of about 1 nanonsecond so as to define a~~ the first frequency is 1 gigahertz~~ pulse train~~.

3. (Currently Amended) The system according to claim 2, wherein the second optical time-quantifiable optical path has a length differing from that of the first time-quantifiable optical path by about 0.5 nanoseconds of pulse travel time, ~~so as to define a~~ and the second frequency is 2 gigahertz~~ pulse train at the second nodal point~~.

4. (Currently Amended) The system according to claim 1, further comprising:

~~a multiplicity of~~ one or more additional optical waveguides each coupled to the first and second nodal points, the additional waveguides being configured to define ~~a multiplicity of~~ respective different time-quantifiable optical paths~~; and~~

~~wherein, the lengths of each of the multiplicity of additional time-quantifiable optical paths having a numerical relationship with each other and with the first time-quantifiable optical path~~.

5. (Currently Amended) The system according to claim 4, wherein ~~the semiconductor laser is configured to provide a pulsed output at a first periodicity and wherein the recombined pulse train at the second nodal point provides a pulse train having a second periodicity,~~ the second frequency ~~periodicity being~~ is a multiple of the first frequency, the multiple ~~defined by the numerical relationship between the multiplicity of additional time-quantifiable optical paths and the first time-quantifiable optical path~~ being a total number of the first optical waveguide, the second optical waveguide, and the additional optical waveguides.

6. (Currently Amended) The system according to claim 5, wherein the ~~semiconductor laser operates at a~~ first frequency ~~of~~ is about 1 gigahertz.

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7. (Currently Amended) The system according to claim 6, wherein ~~the lengths of~~ the ~~multiplicity of~~ time-quantifiable optical paths of the first optical waveguide, the second optical waveguide, and the additional optical waveguides differ ~~from one another by~~ in pulse

travel time in steps of about 0.2 nanoseconds, ~~so as to define a~~ and the second frequency is 5 ~~gigaherts pulse train at the second nodal point~~ gigahertz.

8. (Canceled)

9. (Currently Amended) In an optoelectronic timing system, a method for adaptive frequency generation, comprising:

providing at least one semiconductor laser configured to issue subnanosecond optical pulses;

directing a portion of each pulse from the semiconductor laser through regeneration waveguide;

triggering the semiconductor laser to generate a new pulse when a prior pulse from the laser has traversed the regeneration waveguide, wherein triggering repeated generation of pulse creates ~~defining~~ a periodic pulse train having a first frequency;

providing ~~at least~~ a first optical waveguide~~, the waveguide~~ that is configured to define a first time-quantifiable optical path for a pulse of the train;

providing ~~at least one additional~~ a second optical waveguide~~, the additional waveguide~~ that is configured to define a second time-quantifiable optical path for a pulse of the train ~~different from the first waveguide~~;

directing portions of the pulses of the train into the first and second optical waveguides at a first nodal point; and

recombining pulses of the train from the first and second optical waveguides at a second nodal point, wherein ~~; and~~

~~configuring the lengths of the first and second time-quantifiable optical paths to have a defined numerical relationship to one another, such that the periodicity of pulses recombined at the second nodal point has the same numerical relationship with the periodicity of the issued pulse train~~.

the second time-quantifiable optical path differs from the first time-quantifiable optical path such that each of the pulses coupled into the first and second optical waveguides at the first node results in a first pulse at the second node from the first optical waveguide and a second pulse at the second node from the second optical waveguide; and

pulses arriving at the second node including the pulses from the first and second waveguides have a second frequency that is greater than the first frequency.

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10. (Currently Amended) The method according to claim 9, wherein the ~~at least one semiconductor laser is configured to provide a pulsed output having a periodicity in the range of about 1 nanosecond so as to define a~~ first frequency is 1 gigahertz ~~pulse train~~.

11. (Currently Amended) The method according to claim 10, wherein the second ~~optical~~ time-quantifiable optical path ~~has a length differing~~ differs from the first time-quantifiable optical path by about 0.5 nanoseconds of pulse travel time, ~~so as to define a~~ and the second frequency is 2 gigahertz ~~pulse train at the second nodal point~~.

12. (Currently Amended) The method according to claim 9, further comprising:

~~defining a multiplicity of~~ providing one or more additional optical waveguides ~~each~~ that are coupled to the first and second nodal points, wherein ~~; configuring~~ the additional optical waveguides ~~to~~ define ~~a multiplicity of~~ different respective time-quantifiable optical paths; and

~~wherein, the lengths of each of the multiplicity of additional time-quantifiable optical paths having a numerical relationship with each other and with the first time-quantifiable optical path~~

directing the pulses of the train into the first, second, and additional optical waveguides at the first nodal point; and

recombining pulses of the train from the first, second, and additional optical waveguides at the second nodal point.

13. (Currently Amended) The method according to claim 12, wherein ~~the semiconductor laser is configured to provide a pulsed output at a first periodicity and wherein the recombined pulse train at the second nodal point provides a pulse train having a second periodicity,~~ the second ~~periodicity being~~ frequency is a multiple of the first frequency, the multiple ~~defined by the numerical relationship between the multiplicity of additional time-quantifiable optical paths and the first time-quantifiable optical path~~ being equal to a number of the first, second, and additional optical waveguides.

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14. (Currently Amended) The method according to claim 13, wherein the ~~semiconductor laser operates at a~~ first frequency ~~of~~ is about 1 gigahertz.

15. (Currently Amended) The method according to claim 14, wherein the ~~lengths of the multiplicity o~~f time-quantifiable optical paths of the first, second, and additional optical waveguides differ ~~from one another by~~ in pulse travel time in steps of about 0.2 nanoseconds, ~~so as to define a~~ and the second frequency is 5 gigahertz ~~pulse train at the second nodal point~~.

16. (Canceled)

17. (Canceled)

18. (Currently Amended) ~~The system according to claim 17, further~~ An optoelectronic timing system comprising:

a semiconductor laser;

a pulse detector;

a regenerator coupled to the pulse detector and semiconductor laser; and

a regeneration waveguide ~~having a length equal to the longest length of the multiplicity and~~ coupled to receive pulses from the laser, wherein ~~the regeneration waveguide not coupled to the first or second nodal points; and wherein, a pulse traveling~~ the regeneration waveguide ~~directed~~ directs pulses from the laser to the pulse detector and the regenerator so as to trigger the laser to issue a next pulse, the physical length of the regeneration waveguide defining ~~a fundamental~~ a first frequency of ~~the system~~ a pulse train from the semiconductor laser;

a multiplicity of optical waveguides configured to have lengths differing from one another, each length defining a time-quantifiable optical path for the pulses of the train based upon the time required for a pulse to travel the length, a longest of the multiplicity of optical waveguides defining a travel time equal to that of the regeneration waveguide;

a first nodal point coupled to the multiplicity of optical waveguides at which the pulses of the train are directed into the multiplicity of optical waveguides; and

a second nodal point coupled to the multiplicity of optical waveguides at which pulses that have respectively traversed the multiplicity of optical waveguides are recombined, wherein

the time-quantifiable optical paths differ such that each of the pulses coupled into the optical waveguides at the first node results in a plurality of pulses arriving at the second node at different times; and

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the pulses arriving at the second node have a second frequency that is greater than the first frequency.

19. (Currently Amended) The system according to claim 18, wherein the ~~fundamental~~ second frequency ~~of the system~~ is an integer multiple of the first frequency.

20. (Currently Amended) The system according to claim 19, wherein the ~~periodicity of pulses recombined at the second nodal point defines a frequency which is a~~ integer multiple ~~of the fundamental frequency of the system, the numerical value of the multiple being~~ is equal to the number of waveguides in the multiplicity of optical waveguides.

21. (New) The system of claim 18, wherein the first frequency is greater than 1 gigahertz.

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